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REMARKS

This application has been reviewed in light of the Office Action mailed on December 5, 2003. Claims 1-13 are pending in the application with Claims 1 and 13 being in independent form.

Claims 1-13 were rejected under 35 U.S.C. §103(a) over U.S. Patent No. 5,327,049 issued to Smolka et al. in view of U.S. Patent No. 5,325,024 issued to Piejak et al.

Applicant appreciates the courtesy granted to Applicant's attorney, Michael A. Scaturro (Reg. No. 51,356), during a telephonic interview conducted on February 2, 2004. During the telephonic interview, an issue was raised regarding the "Response to Arguments" made by the Examiner in the previous Office Action. In the Examiner's response to arguments, the Examiner cites that the dielectric constant of glass runs from $\varepsilon = 3$ to $\varepsilon=10$. The Examiner states "Since 1 inch = 2.54 cm, we can assume that any light bulb will have a wall thickness which is less than 1 inch (if $\varepsilon=3$, then $d < 0.8$ cm)". During the interview, Applicant's attorney respectfully pointed out to the Examiner that there appeared to be some confusion regarding the dielectric constant. Specifically, Applicant's attorney indicated to the Examiner's that the dielectric constant ε recited in the independent claims, namely, Claims 1 and 13, (See eq. $d/(f.\varepsilon) < 10^{-8}$ cm.s) is not the dielectric constant of glass, it is the dielectric constant of the two spatially separated capacitive coupling-in structures.

Claim 1 recites

> A high-efficiency low-pressure gas discharge lamp which includes a discharge vessel (1) and at least two spatially separated capacitive coupling-in structures (2) and operates at an operating frequency f, characterized in that each capacitive coupling-in

> structure (2) is formed by **at least one dielectric** having a thickness d and a dielectric constant ε, each dielectric being subject to the condition **$d/(f.\varepsilon) < 10^{-8}$** cm.s thereby providing a high luminous flux in a small structural volume. [Emphasis Added]

During the interview, the Examiner requested information concerning the construction of the capacitive coupling elements, intimating that the structure of the coupling in structures were glass or an equivalent of glass. Applicant's attorney pointed out to the Examiner that this is not the case. The Examiner was referred by Applicant's Attorney to the specification at page 7, lines 27-29, wherein it is stated:

> ...A dielectric coupling in structure at both ends is formed by a a respective cylindrical tube 2 of the dielectric material (**oxide ceramic** satisfying the condition $d/(f.\varepsilon) < 10^{-8}$ cm.s)....[Emphasis Added]

In further support of the distinction between glass and the material of the capacitive coupling in structures, it is stated in the specification at page 10, lines 33-34, that

> Fig. 8 shows a diagram illustrating the variation as a function of temperature of the **dielectric constant ε of an oxide of a ceramic of $BaTiO_3$**.....

Oxide Ceramic material is neither glass nor an equivalent of glass.

In light of the clarifications reached during the telephonic interview, it is hoped that the Examiner has been provided by the Applicant's attorney with sufficient information to allow the Examiner to now fully consider the arguments made in the previous Office Action. Applicant's attorney has taken the liberty of re-stating, in part, the arguments made in the previous Office Action. However, it is suggested that the previous Office Action be used as the controlling document outlining Applicant's arguments.

The arguments previously presented in the prior Office Action are as follows. The advantages recited above are achieved in the low pressure gas discharge lamp of the present invention by utilizing at least two spatially separated capacitive coupling-in structures, operating at a frequency f, wherein each capacitive coupling-in structure is formed by at least one dielectric having a thickness d and a dielectric constant ε, where each dielectric is subject to the condition $d/(f.\varepsilon) < 10^{-8}$ cm.s, as recited in Claim 1. The condition $d/(f.\varepsilon) < 10^{-8}$ cm.s can be written equivalently as a condition regarding the voltage drop over the dielectric, $U_C < I/(2\pi\varepsilon_0 A)10^{-8}$ cm.s. The equivalence of which can be amply provided upon request. Using typical values for the current I of 10 mA and the dielectric's surface A of 0.3 cm^2, the equivalent condition $U_C < I/(2\pi\varepsilon_0 A)10^{-8}$ cm.s yields a voltage $U_C < 600$ V. Further taking into consideration the fact that there are two dielectric coupling-in structures, the lamp's driver is required to supply $(2U_C + U_P)$, U_P being the plasma voltage, typically in the range of 400 – 800 V. For the exemplary values of I=10 mA and A = 0.3 c m^2, U_C is restricted as: $U_C < 600$ V. It follows that $2*U_C <$ 1200 V. Thus, it is shown that $2*U_C$ is substantially in the same range as the plasma voltage U_P of around 600 V. Increasing U_C beyond 600 V leads to several drawbacks:

(1) The idle power (over the capacitance of the dielectrics) increases in relation to the real power (the power deposited within the plasma due to its Ohmic resistance). But the electric utilities supplying the power typically insist on feeding purely Ohmic consumers. Accordingly, the driver has to be more complex.

(2) The driver has to supply the sum voltage of $(2\ U_C + U_P)$, higher sum voltages lead to a more complex driver.

(3) A higher sum voltage will also typically lead to more losses in the driver and more problems concerning electromagnetic emission.

These drawbacks are obviated through the use of at least two spatially separated capacitive coupling-in structures wherein each structure is formed by at least one dielectric having a thickness d and a dielectric constant ε, where each dielectric is subject to the condition $d/(f.\varepsilon) < 10^{-8}$ cm.s, as recited in Claim 1.

It is respectfully submitted that Smolka et al. and Piejak et al., taken alone or in combination, do not disclose or suggest Applicants' invention as recited by Claim 1. In particular, Smolka et al. and Piejak et al., do not disclose or suggest a low pressure gas discharge lamp having at least two spatially separated capacitive coupling-in structures, operating at a frequency f, wherein each capacitive coupling-in structure is formed by at least one dielectric having a thickness d and a dielectric constant ε, where each dielectric is subject to the condition $d/(f.\varepsilon) < 10^{-8}$ cm.s, as recited in Claim 1. Accordingly, withdrawal of the rejection under 35 U.S.C. §103(a) with respect to Claim 1 and allowance thereof are respectfully requested.

Claim 13 recites features which are found in Claim 1. Hence, for at least the same reasons given for Claim 1, Claim 13 is believed to be allowable over Smolka et al. and Piejak et al., taken alone or in combination.

Claims 2-12 depend from independent Claim 1 and therefore contain the limitations of Claim 1. Hence, for at least the same reasons given for Claim 1, Claims 2-12 are believed to be allowable over Smolka et al. in view of and Piejak et al. Accordingly, withdrawal of the rejection under 35 U.S.C. §103(a) with respect to Claims 2-12 and allowance thereof are respectfully requested.

Further, Claim 2 is believed to be allowable not only due to its respective dependency from Claim 1 but also due to the fact that it recites patentable subject matter in its own right. For example, Claim 2 as amended recites that *at least one dielectric is subject to the condition* $d/(f.\varepsilon) < 10^{-9}$ *cm.s thereby allowing the at least two spatially separated capacitive coupling-in structures (2) to operate as a ballast.* When the condition $d/(f.\varepsilon) < 10^{-9}$ cm.s is satisfied, the voltage U_C is no longer considerably smaller than the plasma voltage U_P, hence the U-I characteristic of the discharge lamp and capacitive coupling-in structures will be dominated by the capacitances. In this case, the U-I characteristic will be positive which allows the capacitive coupling-in structures to be used to ballast the lamp, i.e., self-ballasting. A ballast element can then be dispensed with in the lamp drive circuit, offering a substantial cost savings. Moreover, the self-ballasting of the lamp makes it possible to operate a plurality of such lamps in parallel while using a single driver, which leads to further cost savings of the driver.

In view of the foregoing amendments and remarks, it is respectfully submitted that all claims presently pending in the application, namely, Claims 1 – 13 are believed to be in condition for allowance and patentably distinguishable over the art of record.

If the Examiner should have any questions concerning this communication or feels that an interview would be helpful, the Examiner is requested to call Dicron Halajian, Esq., Intellectual Property Counsel, Philips Electronics North America Corp., at 914-333-9607.

Respectfully submitted,

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